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MIRROR STEREOSCOPE PARALLAX WEDGE

by H. Gyde Lund, *Associate Photogrammetrist*

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ABSTRACT

Modification of a conventional parallax wedge for use with a mirror stereoscope is described.

Mirror stereoscopes have two distinct advantages over lens-type stereoscopes: (1) the entire stereo model can be viewed without moving the photos and (2) height measurements on 9- by 9-inch photos can be made without cutting. A major disadvantage is the general lack of inexpensive photogrammetry tools that can be used with mirror stereoscopes. However, a simple and economical device for measuring heights can be made in about half an hour by modifying a standard parallax wedge, such as the U.S. Forest Service's version for mountainous areas.[1/] The cost would be less than $5 compared with $150 for a parallax bar.

The parallax wedge is basically a pair of converging lines with which one measures the distance that a point on one photo (i.e., top of an object) is separated from the same image point on the conjugate stereo photo. The top and bottom ends of the converging lines are a precisely measured distance apart. The bottom distance between lines is greater than the top by about 1 inch. The distance between any two corresponding points on the converging lines is printed on a scale located on the right-hand line. Heights are obtained by subtracting the separation reading at the top of an object from the reading at the object's base and applying this parallax *difference* to a height formula.

[1/] Karl E. Moessner and S. Ross Tocher. Parallax wedge improved. USDA Forest Serv. Intermountain Forest & Range Exp. Sta. Res. Note 94, 2 pp. 1962.

The differences between the two readings, not the readings per se, are essential for height determinations.

The average separation of corresponding points on adjacent photos corresponds to the distance between the viewing lenses. Therefore, the wedge is designed for a particular type of stereoscope. The most commonly used wedge for a lens stereoscope can directly measure photo point separations ranging from 2 inches to approximately 3 inches; however, the common wedge cannot be used with the mirror stereoscope because the lines are too close together. Most mirror stereoscopes have a photo point separation of approximately 8.25 inches. To make the parallax wedge usable with the mirror stereoscope, the lines should have an average separation of 8.25 inches. The separation of the modified wedge would be 7.75 inches at the top and 8.75 inches at the bottom to be the equivalent of a standard wedge with 2- and 3-inch separations.

Materials for construction of the mirror-stereoscope wedge are:

1 piece heavy acetate, 10 by 12 inches
1 ruler graduated in 100th's of an inch (Pickett No. 33E)[2/]
12-inch ruler
needle or scribe
grease pencil
transparent tape
1 standard parallax wedge for mountainous areas[3/]

The procedure for modifying the wedge is as follows:

1. Draw a fine line lengthwise down the middle of the 10- by 12-inch acetate.

2. Center the acetate over the wedge and scribe a line through the uppermost pair of separation readings of the wedge and another through the lowermost pair of separation readings onto the acetate (fig. 1A).

3. Subtract the reading at the top of the wedge from the bottom and divide by 2:

Top = 2 inches
Bottom = 2.9 inches
Difference = 0.9 inch
Quotient = 0.45 inch

[2/] Mention of trade names or products does not imply endorsement by the U.S. Department of Agriculture.

[3/] Available through Regional Forester, USDA Forest Service, R-4, 324 25th Street, Ogden, Utah 84401.

4. Subtract the quotient from the desired average separation (i.e., separation distance of stereoscope to be used) for the new top reading and add the quotient to the desired average separation for the new bottom reading:

Desired average separation = 8.25 inches
New top separation = 8.25 - 0.45 = 7.80 inches
New bottom separation = 8.25 + 0.45 = 8.70 inches

5. Divide the new top and bottom separations in half:

7.80/2 = 3.90 inches
8.70/2 = 4.35 inches

6. Mark off the distance found in step 5 on each side of the center line along the respective top and bottom scribed line.

7. Cut wedge in half lengthwise.

8. Mount each half of wedge on the underside of the acetate so that the top and bottom of each half correspond with the points marked off in step 6 (fig. 1B).

The photos should be prepared for height measurements in the usual manner, except that the distance between the principal point and the conjugate principal point should be 8.25 inches. The wedge separation has been increased 5.80 inches throughout. Even though no change has been made in the labeling on the wedge (i.e., where the wedge indicates 2 inches, the actual distance is 7.80 inches), the *differences* in parallax readings will be correct.

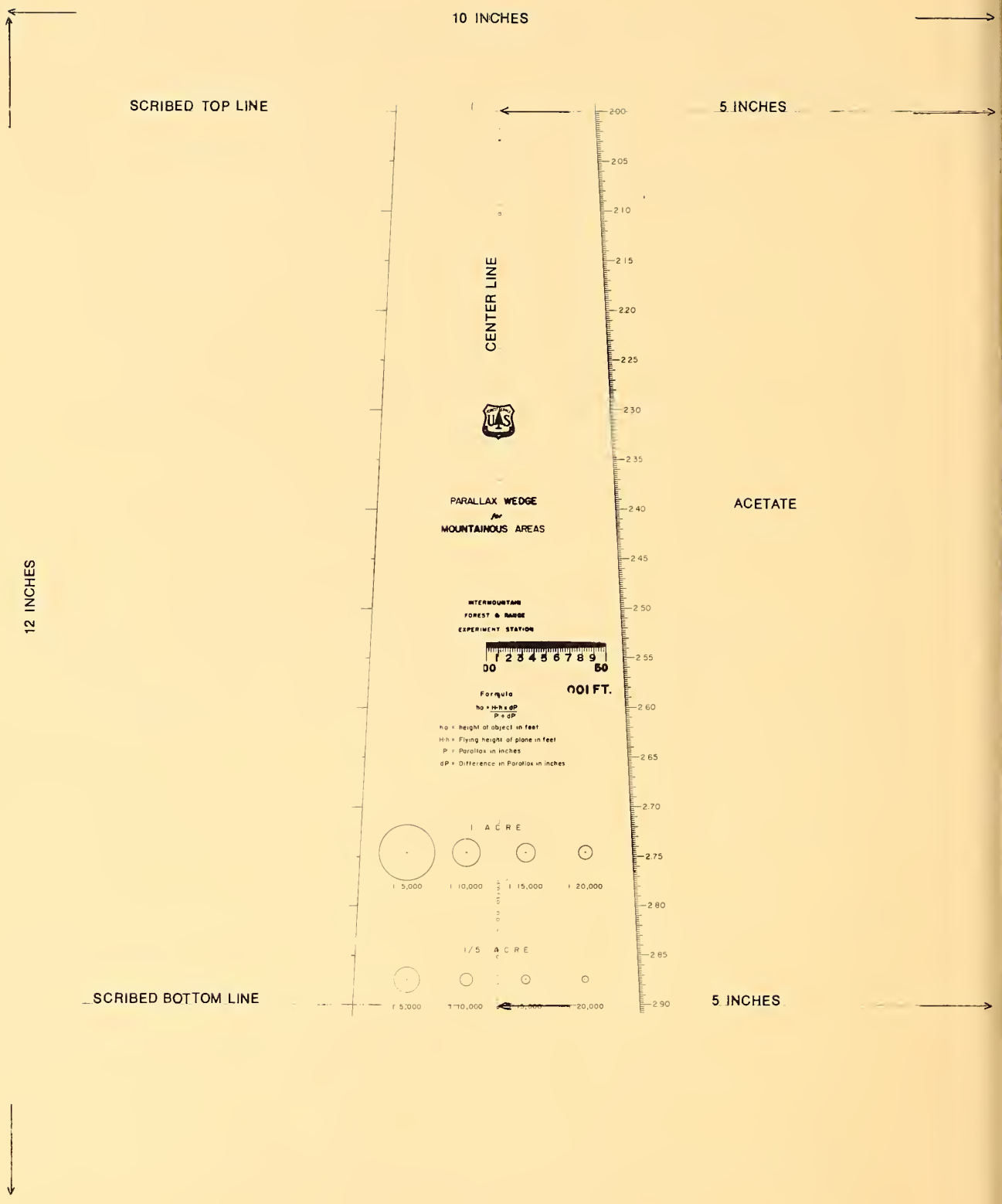

Figure 1A.--*Construction of a mirror parallax wedge: Acetate is centered on wedge; top and bottom lines are scribed.*

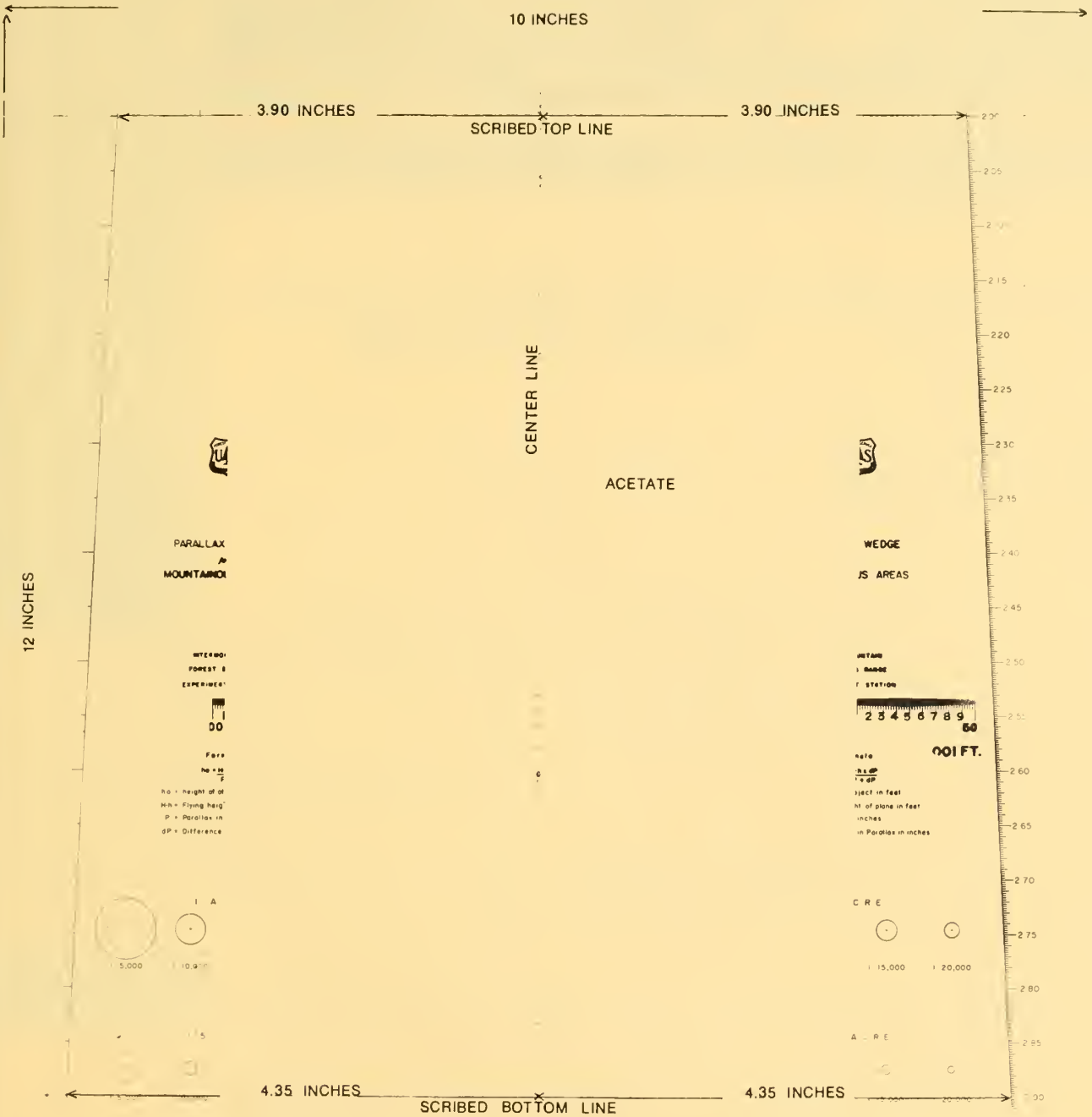

Figure 1B.--*Construction of a mirror parallax wedge: Wedge is split apart and taped to acetate at proper distance along top and bottom.*